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MULTIPLE COLOR ABNORMALITIES IN A WINTERING MEW GULL

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Reports of aberrant plumages and bare-part colors appear now and then on electronic mailing lists and in journals, including this one (Garrett 2001). Typically they pertain to birds with single color aberrations (Collins 2003). Such birds generally are abnormally pale or entirely white, have white spotting, or less frequently are unusually dark (Howell et al. 1992). Occasionally they are yellow where they should be red or have orange instead of yellow bills, legs, or feet (Bell 2010). Exceptionally, birds display two color abnormalities (Sage 1962). An example was a blackish brown Mew Gull (*Larus canus*) with white patches scattered over the body and wings (Winter 1985). Here we present photographic documentation of a Mew Gull affected by four color abnormalities, apparently more than have been reported in any bird species.

On 3 February 2002, Ron Storey photographed an oddly plumaged presumed adult Mew Gull at Las Gallinas wastewater-treatment ponds in Terra Linda, Marin County, California. The bird has been detected at the same location each winter since then, most recently in January 2012. In subsequent years the plumage did not change, indicating that the bird was an adult when first found in 2002. Compared with a normal Mew Gull in definitive basic plumage, this bird had (1) pure white wings, lacking the normal black wingtips and gray upper surface; (2) pale gray rather than medium gray scapulars, of a shade similar to that of a Ring-billed Gull (*Larus delawarensis*); (3) a white rather than smudgy gray-brown forehead and forecrown; (4) dusky markings on the back of the head darker than normal; (5) a broken black band across the middle of the tail instead of an all-white tail; and (6) a bright orange rather than dull greenish yellow bill, legs, and feet (see this issue's back cover, both inside and outside).

Under conventional terminology, this bird might be dismissed as simply leucistic, albinistic, or partially albinistic. Such unfocused terms, however, obscure the details and means by which the effects have been produced. More precisely, this gull appears to be affected by four previously defined conditions (Davis 2007): amelanism, hypermelanism, hypomelanism, and carotenism. The white wings, forehead, and forecrown result from the abnormal absence of melanin in those areas (partial amelanism). In contrast, an abnormally high concentration of melanin accounts for the partial dark hood and broken black band on the tail (partial hypermelanism). The scapulars owe their ashen hue to an abnormal reduction in melanin concentration (partial hypomelanism), while the orange rather than yellow bare parts may be caused by an abnormal increase in carotenoid concentration or a change in type of carotenoid pigment (carotenism). Alternatively, the apparent change in carotenoid pigmentation could have resulted from a lack of melanin in the bird's bare parts.

In reviews of aberrant coloration in North American birds, Gross (1965a) cited 33 cases of albinism among the Laridae involving 10 species, which he did not list, and (1965b) two cases of melanism, one in the Herring Gull (*Larus argentatus*), another in the Laughing Gull (*Leucophaeus atricilla*). Gross's review of albinism addressed birds affected by amelanism and hypomelanism. There have been no subsequent reviews of such cases, but searching online images with the terms "albino gull" and "leucistic gull" revealed numerous occurrences involving at least a dozen species of North American gulls, including the Black-legged Kittiwake (*Rissa tridactyla*) and the Bonaparte's (*Chroicocephalus philadelphia*), Franklin's (*Leucophaeus pipixcan*), Heermann's

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(*Larus heermanni*), Mew, Ring-billed, Western (*Larus occidentalis*), California (*Larus californicus*), Herring, Lesser Black-backed (*Larus fuscus*), Glaucous-winged (*Larus glaucescens*), and Great Black-backed (*Larus marinus*) gulls. Searching for “melanistic gull” produced substantially fewer cases involving three North American species, the Laughing, Ring-billed, and Lesser Black-backed. A published case of apparent hypermelanism involved a California Gull (King 1999). Gulls also are known to be subject to carotenism, with orangish yellow instead of greenish yellow legs in the California Gull (Wilson 2003), orange instead of pink legs in the Glaucous-winged Gull (Vermeer et al. 1963) and Western Gull (Davis 2007), and pink flushes through normally white body feathers of the Ring-billed Gull (Hardy 2003, McGraw and Hardy 2006). There are very few published reports of birds with more than one aberrant color condition (see discussion in Winter 1985, for example), and we know of no case of a wild bird with more than two color aberrations.

Genetic mutations as well as environmental factors such as diet, injury, and stress influence the expression of pigments in birds (Sage 1962). In this case, the Mew Gull’s color abnormalities, which remained consistent from winter to winter over 10 years, are presumably due to permanent genetic rather than temporary environmental factors. Plumage-color aberrations due to environmental factors are likely to change with each molt as a function of exposure to different foods or recovery from injury or stress. Bare-part colors probably would change on a shorter time scale. However, the potential genetic and physiological mechanisms responsible for all of this Mew Gull’s color abnormalities are unknown. Pigmentation is a complex biological process controlled by the products of numerous genes on multiple loci. Furthermore, the metabolic pathways for the expression of melanins and carotenoids are independent (Hill and McGraw 2006). Nevertheless, parsimony favors a single cause of the observed aberrations rather than independent mutations in several different genes. A single mutation in a regulatory gene controlling the expression or activity of pigmentation genes lying downstream could be responsible for the unusual color of this Mew Gull. Although such mutations often also influence traits other than pigmentation (Mundy 2005), this bird showed no evidence of other abnormalities.

Birds with color abnormalities, particularly with amelanism, are generally thought to have lower survivorship than their normally colored counterparts (Ellegren et al. 1997). Yet this bird was at least 12 years old when last observed. Although probably well shy of the North American longevity record of nearly 21 years (Lutmerding and Love 2011), it had reached or exceeded the maximum age of normally colored birds of 12 years for males and 8 years for females recorded by Craik (1997 cited in Moskoff and Bevier 2011) in Scotland.

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